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निर्माण के लिये पकी मिट्टी की ईंटें —  
परीक्षण पद्धति

भाग 6 भंजन के मापांक का निर्धारण

Burnt Clay Building Bricks —  
Methods of Test

Part 6 Determination of Modulus of Rupture

ICS 91.100.25

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भारतीय मानक ब्यूरो  
BUREAU OF INDIAN STANDARDS  
मानक भवन, 9 बहादुरशाह ज़फर मार्ग, नई दिल्ली – 110002  
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG  
NEW DELHI-110002  
[www.bis.gov.in](http://www.bis.gov.in) [www.standardsbis.in](http://www.standardsbis.in)

## FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Clay and Stabilized Soil Products for Construction Sectional Committee had been approved by the Civil Engineering Division Council.

Standard methods of testing burnt clay bricks are essential adjuncts to the various burnt clay brick specifications.

This standard, IS 3495 was first published in 1966 and subsequently revised in 1973, 1976, 1992 and 2019 covering four parts (Part 1 to Part 4). Earlier all the tests to evaluate the physical properties of burnt clay bricks were covered in one standard but for facilitating the use of this standard and future revisions, the revised standard was brought out in different parts, each part covering different test.

This standard (Part 6) is a new addition to this series of standards and it details the procedure for testing modulus of rupture of burnt clay bricks by flexural testing. The other parts in this series now, are:

- Part 1 Determination of compressive strength
- Part 2 Determination of water absorption
- Part 3 Determination of efflorescence
- Part 4 Determination of warpage
- Part 5 Determination of initial rate of absorption

The composition of the Committee responsible for the formulation of this standard is given in Annex A.

In reporting the result of a test or analysis made in accordance with this standard, if the final value observed or calculated, is to be rounded off, it shall be done in accordance with IS 2 : 2022 'Rules for rounding off numerical values (*second revision*)'.

*Indian Standard***BURNT CLAY BUILDING BRICKS —  
METHODS OF TEST****PART 6 DETERMINATION OF MODULUS OF RUPTURE****1 SCOPE**

This standard (Part 6) covers the procedure for testing modulus of rupture for the burnt clay bricks by flexural testing.

**2 APPARATUS**

**2.1 Flexure Test Assembly** — The flexure test assembly for flexure test shall meet the following requirements:

- It shall have a span approximately 25 mm less than the basic unit's length. It shall have two bearing rollers and a steel bar 6 mm × 35 mm (height × width) and of a length at least equal to the width of the specimen for applying the load.
- It shall ensure application of load normal to the loaded and supported surfaces of the specimen and in such a manner as to avoid any eccentricity, restraint or torsion.

**2.2 Hot Air Oven** — The hot air oven shall be capable of maintaining a temperature of 110 °C.

**2.3 Timing Device** — The timing device, such as stop watch or stop clock shall be capable of indicating the time nearest to 1 s.

**2.4 Thermometer** — The thermometer shall be capable of measuring temperature to the nearest 1 °C.

**2.5 Weighing Balance** — The weighing balance shall have an accuracy of 0.5 g.

**3 CONDITIONING THE SPECIMEN**

Dry the bricks in the hot air oven at 110±5 °C for not less than 24 h and to attain constant mass such that two consecutive masses taken at an interval of 2 h shall not vary by more than 0.20 percent. After drying, cool the bricks in a room maintained at a temperature of 25±10 °C with relative humidity between 30 and 70 percent such that the surface temperature is within 3 °C of the ambient room temperature.

**4 PROCEDURE****4.1 Test Specimens**

The test specimens shall consist of whole full-size units that have been dried and cooled as per 3. Five such specimens shall be tested.

**4.2** The test specimen shall be supported flatwise (that is, apply the load in the direction of the depth of the unit) on the span and loaded at midspan (three point bending test). Specimens having recesses (frogs or depressions) shall be so placed such that the recesses are on the compression side. The load should be applied to the upper surface of the specimen through the steel plate.

Make sure the supports for the test specimen are free to rotate in the longitudinal and transverse directions of the test specimen and adjust them so that they will exert no force in these directions.

The rate of loading shall not exceed 9 kN/minute or rate of piston moving head of the testing machine is not more than 1.2 mm/minute.

**4.3 Calculation of flexure strength and Report**

Calculate the modulus of rupture of each specimen to the nearest 0.01 MPa as follows:

$$f_{bt} = \frac{3P\left(\frac{l}{2} - x\right)}{bd^2}$$

where

$f_{bt}$  = modulus of rupture of the specimen at the plane of failure, in MPa;

$P$  = maximum load at failure, in N;

$l$  = distance between the centre of the supports, in mm;

$b$  = net width (face to face minus voids) of the specimen at the plane of failure, in mm;

$d$  = depth (bed surface to bed surface), of the specimen at the plane of failure, in mm; and

$x$  = average distance from the midspan of the specimen to the plane of failure measured in the direction of the span along the centre line of the bed surface subjected to tension, in mm.

Report the average of minimum five values of modulus of rupture to the nearest 0.01 MPa.

In case of the  $f_{bt}$  varying beyond 15 percent of the mean value, the same shall be discarded. In such cases, the average of minimum 4 values shall be reported.

## ANNEX A

( Foreword )

## COMMITTEE COMPOSITION

Clay and Stabilized Soil Products for Construction Sectional Committee, CED 30

<i>Organization</i>	<i>Representative(s)</i>
Indian Institute of Science, Bengaluru	DR B. V. VENKATRAMA REDDY ( <b>Chairman</b> )
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In Personal Capacity (651/37, Ganga Enclave, Sainik Colony, Roorkee 247667)	DR J. M. BHATNAGAR
BIS Directorate General	SHRI ARUN KUMAR S., SCIENTIST 'E' AND HEAD (CIVIL ENGINEERING) [ REPRESENTING DIRECTOR GENERAL ( <i>Ex-officio</i> ) ]

*Member Secretary*

SHRIMATI DIVYA S.  
SCIENTIST 'C' (CIVIL ENGINEERING), BIS





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This Indian Standard has been developed from Doc No.: CED 30 (15752).

### Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

## BUREAU OF INDIAN STANDARDS

### Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002

Telephones: 2323 0131, 2323 3375, 2323 9402

Website: [www.bis.gov.in](http://www.bis.gov.in)

### Regional Offices:

	Telephones
Central : 601/A, Konnectus Tower-1, 6 <sup>th</sup> Floor, DMRC Building, Bhavbhuti Marg, New Delhi 110002	{ 2323 7617
Eastern : 8 <sup>th</sup> Floor, Plot No 7/7 & 7/8, CP Block, Sector V, Salt Lake, Kolkata, West Bengal 700091	{ 2367 0012 2320 9474
Northern : Plot No. 4-A, Sector 27-B, Madhya Marg Chandigarh 160019	{ 265 9930
Southern : C.I.T. Campus, IV Cross Road, Taramani, Chennai 600113	{ 2254 1442 2254 1216
Western : Plot No. E-9, Road No.-8, MIDC, Andheri (East), Mumbai 400093	{ 2821 8093

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